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On Pair-List Readings

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0. Introduction

May(1985) is credited with having first noticed the contrast between sentences like those in (1) and (2). (1a) allows for a *pair-list answer*, as in (1b), but (2a) doesn't (see (2b)). One difference between the two sentences concerns the fact that the extraction site is below the quantifier in (1) but above it in (2).

(1)

a. [[**which boy**]$_k$ did [IP **every girl** meet t_k at the park?]]
b. Mary met Bill, Susan met John, ...(pair-list(PL) answer)

(2)

a. [[**Which boy**]$_k$ [IP t_k met **every girl** at the park?]]
b. *Bill met Mary, John met Susan, ...

Based on this contrast, May developed a view of the phenomenon that has been adopted by several researchers (e.g., Aoun and Li (1993), Chierchia (1991, 1993), Sharvit (1997)) becoming more or less standard. According to this view PL-readings are licensed in configurations that instantiate nesting, but not in those that create crossing paths. This is schematized in (3). Researchers have thus sought to rule out the possibility of Pair-list readings in crossing environments through one mechanism or another. In May (1985), for instance, the relevant mechanism is Pesetsky's (1982) path containment condition (PCC); in Chierchia (1991, 1993) the mechanism invoked is weak cross over (WCO).

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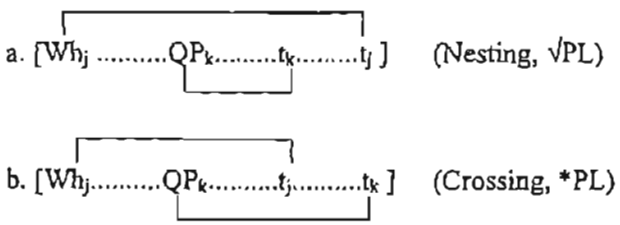
NELS 30

(3)



In this paper, I will argue that nesting configurations are neither sufficient nor necessary to license PL-readings, and that such readings can occur in any of the configurations in (3)[1], but only if the restriction of the *wh*-phrase can be reconstructed below the quantifier. To do this, I first discuss data in Spanish and English that show that nesting is both insufficient (Sect. 1.1) and unnecessary (Sect. 1.2) for the availability of PL-answers. The conclusion of those sections is that we need an alternative account of the phenomenon not based on the assumption that there is a nesting-crossing asymmetry in the distribution of list readings. I then examine *wh*-quantifier interaction in the raising construction (Sect. 2, 2.1) concluding that reconstruction is necessary for list readings to be available. In the remaining sections I discuss the theory of reconstruction assumed in the paper and adopt a Karttunen style semantics for questions, arguing that PL-interpretations are possible because *wh*-phrases are ambiguous between first-order existential quantifiers over individuals and higher-order existential quantifiers over Skolem functions[2]. In the latter case there will be a free individual variable inside the restrictor of the *wh*-phrase that needs to be bound for the sentence to be interpretable. I argue that reconstruction provides a chance for binding the free variable. Thus, the need for syntactic reconstruction of the restriction of the *wh*-DP is grounded in the semantics of such interrogative phrases. My proposal can be considered a modification of the Engdahl-Chierchia theory of functional *wh*-phrases.

1. The Relevant Data

1.1. Condition C and Pair-List Readings (Spanish and English)

[1] Besides PL-interpretations, questions with quantifiers with any of the structures in (3) allow for a single answer (SA). Thus both (1a) and (2a) with the structure in (3a) and (3b), respectively, can be answered as in (i).

(i) Bill

Although all the questions discussed in this paper allow for SAs, I will feel free to ignore them since they are not the main focus of the paper.

[2] That *wh*-phrases are semantically existential quantifiers is more or less standard, see Karttunen (1977). Relevant references also include Katz and Postal (1964), and Baker (1968), But see Groenendijk and Stokhof (1984) for an alternative view. The functional meaning of *wh*-phrases is defended in Engdahl (1980, 1986) and Chierchia (1991, 1993), among others. My approach to functional *wh*-phrases differ slightly from previous approaches in ways that will become clear later in the paper.

In Spanish, questions like that in (4a) don't allow PL-answers, as shown in (4b). By contrast, (5a) does, as the acceptability of (5b) indicates. English behaves similarly: the glosses allow the same readings as the examples.

(4)

a. [A cual jugador en el equipo de Pat Riley$_k$]$_j$ le entregó pro$_k$ cada premio t$_j$?
to which player in the team of Pat Riley cl-award-pst. pro each prize t$_j$
'[To which player in Pat Riley$_k$'s team]$_j$ did he$_k$ award every/each prize t$_j$'

b. *El primer premio a Morning, y el segundo, a Hardaway.
'The first prize to Morning, and the second prize to Hardaway.'

(5)

a. [A cual jugador en su$_k$ equipo]$_j$ le entregó Pat Riley$_k$ cada premio t$_j$?
to which player in his team cl-award-past Pat Riley each prize t$_j$
'[To which player in his$_k$ team]$_j$ did Pat Riley$_k$ award every/each prize t$_j$?'

b. El primer premio a Morning, y el segundo a Hardaway.
'The first prize to Morning, and the second prize to Hardaway'

The contrast illustrated in (4) and (5) is interesting because both sentences constitute cases of nesting, yet (5), but not (4), allows for a PL-answer. The only relevant difference between (4) and (5) is that in the former case the fronted phrase contains an r-expression coindexed with the subject of the clause as opposed to the latter sentence, where the r-expression is in subject position itself. If at least reconstruction of the restriction of the *wh*-phrase below the quantifier is necessary for PL-readings to be available, the relevant contrast can be accounted for. In (4), the restriction of the fronted phrase cannot be lowered since that will place the r-expression within the c-command domain of the subject in violation of Binding Condition C. In (5), nothing prevents reconstruction of the restriction of the question word as it only contains a pronoun. In short, the data in (4)-(5) shows that a nesting configuration is not sufficient for PL-readings to be available, as assumed in previous approaches, since reconstruction of (at least) part of the *wh*-phrase is still needed in order to account for the contrast. One can then ask the question of whether nesting is necessary for PL-answers to be licensed. I address this question in the following section.

1.2. Nesting Configurations are not Necessary for PL-readings

The question-answer pair in (6) constitutes a problem for the hypothesis that nesting is necessary for the appropriate licensing of PL-readings.

(6)

a. [[**Which boy**]$_k$ [IP t$_k$ met **each girl**?]]
b. Bill, Sarah; Frank, Susan; ...

In (6a), the *wh*-phrase has been extracted from the subject position. The subject position is standardly taken to c-command the object position. One way for the *wh*-phrase to take scope below the quantifier, in (6), requires the latter to move to some position between the *wh*-phrase and its trace. This, however, will result in a crossing configuration, which, according to previous approaches, does not license PL-readings. The fact that (6) allows a PL-answer is a strong counterexample to the hypothesis that only nesting makes a PL-interpretation available.

At this point, the reader might be considering the possibility of allowing *each girl* in (6) to take scope over the entire interrogative sentence by adjoining it to the root CP-node at LF. One might then assume that by some unknown reasons *each*, but not *every*, can somehow participate in such an adjunction, which would indeed result in a nesting configuration. This move will distinguish correctly between sentences like (6a) and (2a), but it will overshoot the mark in many cases. For instance, it predicts, contrary to facts, that the contrast discussed above in (4) and (5) should not exist as both sentences should then be ambiguous in Spanish, and in English when the quantifier is *each*, regardless of the binding relations in them. In addition, the hypothesis will fail to extend to cases in which it appears that PL-readings obtain in crossing configurations involving *every*. Consider examples like that in (7), taken from Chierchia (1993) where the subject *wh*-phrase is less definite than a *which*-phrase.

(7)

a. [**Who**]$_k$ t_k put **everything** on the platter?
b. Bill, the chicken salad; Frank, the chow mein; ...

I will conclude that (6) and (7)[3] are indeed counterexamples to the claim that only nesting licenses PL-readings. We must therefore find an account of the phenomenon that is not based on the assumption that there is a nesting-crossing asymmetry in the distribution of such interpretations.

To summarize the paper so far, I have shown that nesting is not sufficient to license PL-readings (section 1) and that it isn't necessary either since, as we saw in this section, such readings can also occur in crossing configurations. I have also shown that reconstruction seems to be necessary for the availability of PL-answers in structures like those in (3). We have also seen that the nesting-crossing asymmetry, usually called a subject-object asymmetry, seems to depend on two things: the type of the *wh*-phrase (whether it is a *which*-phrase as in (1) or less definite like the *who*-phrase in (7)) and the type of the quantifier involved (*each* vs. *every*). We still need an account of why the relevant asymmetry obtains where it does, namely in sentences like (1) and (2), repeated below as (8) and (9), when the quantifier is *every* and the *wh*-phrase is a *which*-phrase.

[3] Chierchia (1993), following insights by May (1985); Krifka (1992); and Shrivastav (1992), assumes that the PL-interpretation of (7) is related to the fact that *who*-phrases allow for a plural interpretation even though they are morphologically singular. It has been argued that PL-readings arising out of cummulative readings of plural NPs are not the result of scope (e.g., Krifka (1992)). So (7) is not a counterexample to the claim that PL-readings are licensed in nesting configurations under Chierchia's assumption, but see Agüero-Bautista (1999) for various arguments against the plurality hypothesis.

(8)

a. **[[which boy]**$_i$ did [IP **every girl** meet t_i at the park?]]
b. Mary met Bill, Susan met John, ...

(9)

a. [**[Which boy]**$_i$ [IP t_i met **every girl** at the park?]]
b. *Bill met Mary, John met Susan, ...

In the next section, I discuss data that will help us explain this asymmetry. I will explain some differences between *each* and *every*, and will reinforce the hypothesis that syntactic reconstruction is necessary for PL-readings to be available.

2. Wh-QP interactions in Raising Constructions

Raising constructions behave like their non-raising counterparts with respect to *wh*-quantifier scope interactions. Notice that the scopal relations of the relevant DPs in (10)-(11) are reproduced in (12)-(13). The interacting DPs appear in bold face; the notation '><' means that the item to the left of the facing brackets can take scope over the item to the right and vice versa.

(10) a. **Some boy** met **every girl** (∃><∀)
b. **Which boy** met **every girl**? (SA, *PL)

(11) a. **Some boy** met **each girl** (∃><∀)
b. **Which boy** met **each girl** (SA, PL)

(12) a. **Some boy** seems to have met **every girl** (∃><∀)
b. **Which boy** seems to have met **every girl**? (SA, *PL)

(13) a. **Some boy** seems to have met **each girl** (∃><∀)
b. **Which boy** seems to have met **each girl**? (SA, PL)

Since raising constructions have more structure than their non-raising counterparts, it is easier to test with them whether reconstruction is in fact necessary for the availability of PL-readings. In particular, making the subject-to-subject raised *wh*-phrase or quantifier bind an anaphor or bound pronoun in the matrix clause will prevent reconstruction into the embedded clause. If reconstruction below the embedded quantifier in (10)-(13) is necessary for the availability of PL-answers and inverse scope generally, there should not be such readings in the binding environments just described. This prediction is in fact borne out. Contrast (13a-b) with (14a-b) respectively.

(14) a. **Some boy** seems to his mother to have met **each girl**. (∃>*<∀)
b. **Which boy** seems to his mother to have met **each girl**? (SA, *PL)

In (14a) the indefinite in the matrix clause does not take scope below the universal quantifier in the embedded clause, and neither is there a PL-interpretation in the question

in (14b). What these data show is that reconstruction is necessary for the availability of inverse scope and PL-readings. In (14) the subject of *seem* cannot be reconstructed as that would leave the bound pronoun in the phrase *his mother* without a binder. When nothing prevents reconstruction, the readings are readily available as in (13). The data also seem to show that *each* and *every* have a different syntax. That is, if reconstruction is necessary for PL-readings, as shown in (10)-(14), then it must be the case that when reconstruction is possible the *which*-phrase, in sentences like (12b) and (13b), can be reconstructed below the quantifier *each* in surface object position, but not below the quantifier *every*. But this is only possible if at LF *each* can move higher from the surface object position than *every* can so that the *wh*-phrase can be reconstructed between the two positions. In addition these data show that it seems to be a property of *which*-phrases that they fail to scope (reconstruct) below *every* in object position; indefinite quantifiers and *wh*-phrases can: inverse scope is possible in (13a) and a PL-interpretation is possible for (7) repeated below as (15).

(15)

a. [**Who**]$_k$ t_k put **everything** on the platter?
b. Bill, the chicken salad; Frank, the chow mein; ...

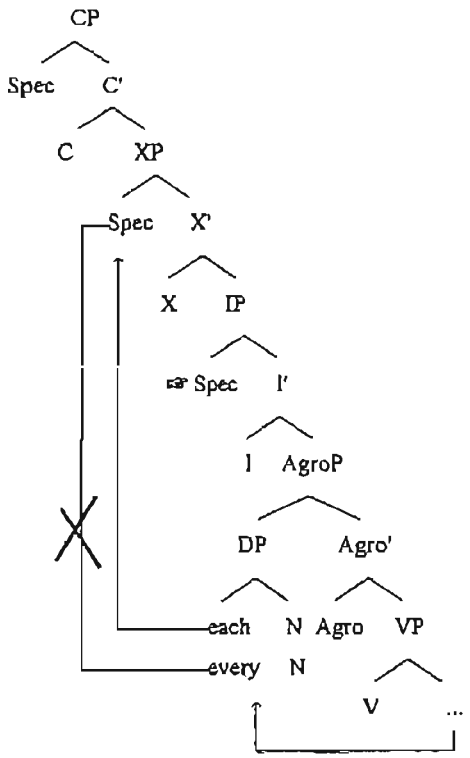
The relevant differences between *which*-phrases and other *wh*-phrases on the one hand, and between the quantifiers *each* and *every*, on the other, will be discussed in the next section.

2.1. Differences Among Quantifiers/*wh*-phrases

How is it possible that *each* and *every* have a different syntax? This is not possible if there is one general mechanism in the grammar, say QR, moving quantifiers around since such a device will treat all quantifiers alike always moving them to the same places. However, the checking approach to quantifier movement independently defended in Hornstein (1995), Beghelli (1997), and Beghelli and Stowell (1997) constitutes a genuine alternative to the QR approach. Adopting a modified version of the checking approach, I will assume that *each* can move, at LF, to a phrase I call XP situated to the left of the IP-node in (16). The driving force of this movement is, presumably, some abstract morphological feature.[4] With this assumption we are one step closer to providing an account of the contrast between (12b) and (13b). In particular, if *every* can only move to its case position (i.e., [Spec, AgroP]) at LF, and if *each* can move past its case position to [Spec, XP] in (19); there will be a position mediating between the two where the *wh*-phrase can be reconstructed, namely the [Spec, IP] position indicated by the '☞' symbol.

[4] I will leave the exact nature of XP in (16), as well as the relevant feature involved in attracting *each* to that phrase, as an open matter for future research to settle. Sabine Iatridou has suggested to me that XP might simply be some version of Sportiche's (1992) clitic-phrase, which is located higher than AgrsP and seems to be related to specificity. This observation is interesting given that in modern Greek the counterpart of *each* can be clitic-doubled, unlike the counterpart of *every*. The former quantifier also requires the definite article in the clitic-doubled construction. In Sportiche's system, a clitic-doubled phrase has to move to the Spec of the clitic-phrase at LF. In the case of modern Greek this suggests that the counterpart of *each* moves higher than Agrs, unlike the counterpart of *every*.

(16)



Although this move can explain why sentences with *which*-phrases in subject position and *each* in object position allow for PL-interpretations, nothing so far explains why such *wh*-phrases, as opposed to indefinites, fail to take scope under *every*-phrases when the latter are in object position. Notice that to scope below an item that is stuck in the object position of a clause as in (16), the subject must be reconstructed to the VP internal position. So it appears that *which*-phrases, as opposed to indefinites and other less definite *wh*-phrases, are blocked from being reconstructed into such a position. But why should this be so? An insight from Heim (1987) will help us answer this question. Heim basically observes that in existential constructions indefinite *wh*-phrases allow for a construal in which their restrictions are interpreted narrowly, i.e. in the base positions, as opposed to definite *wh*-phrases, whose restrictions cannot be interpreted in situ given the Definiteness Restriction. It is important to observe at this point that there seems to be a correlation between *wh*-phrases that qualify as indefinite by the there-insertion criterion and those that support PL-readings with *every* in object position.[5] Consider the following examples.

[5] The correlation however is not always a neat one. Judgments of native speakers of English vary with respect to the acceptability of *who*-phrases in there existential contexts. Some find them to be bad but not to the same degree as the *whose*-phrase in (20). Some find them to be not as good as a *what* or *how many*-phrase. Heim (1987) discusses the example in (i), below, which she attributes to Safir (1982):

(i) ?Who was there in the room when you got home?

(17) a. How much coffee is there in the kitchen cabinet?
b. How much coffee will keep every student awake? (√PL)
c. 2 cups, Meltem; 3 cups, Jay; and 1 cup; Bridget.

(18) a. How many students are there in the Department of Linguistics?
b. How many students took every candidate out for dinner? (√PL)
c. 2 students, Danny Fox; 4 students, Norvin Richards; ...

(19) a. What is there in the fridge?
b. What brought every syntactician to Cambridge? (√PL)
c. The BU conference, L. Rizzi; The Harvard conference, R. Kayne; ...

(20) a. *Whose dog is there in the yard?
b. Whose dog bit every boy? (SA, *PL)
c. Bill's dog did/ *Bill's dog bit Bobby, Susan's dog, Jack;...

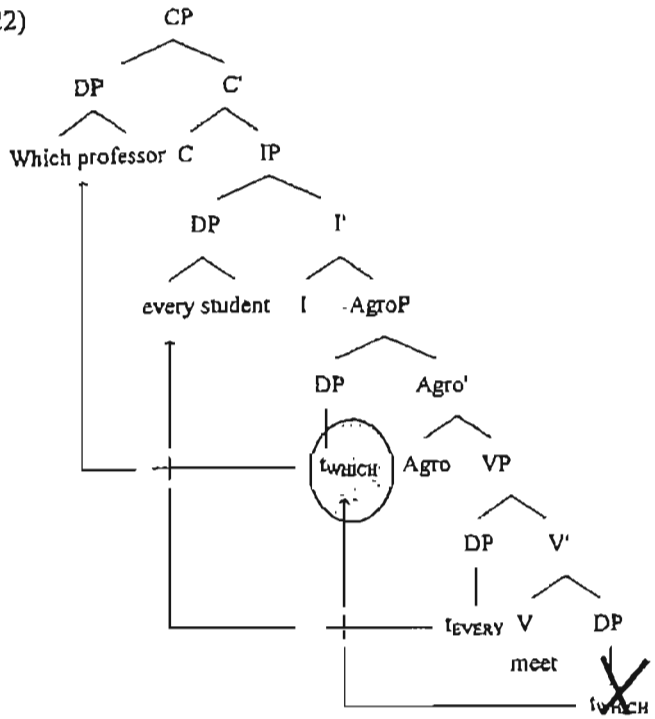
It is clear from the data in (17)-(20) that only *wh*-phrases that qualify as definite in there-insertion environments fail to support PL-readings when occurring in subject position. Combining Heim's generalization with insights by Diesing's (1992), I suggest that reconstruction is constrained by the restriction in (21), which I call Diesing's restriction.

(21) Diesing's Restriction
Don't reconstruct a presuppositional phrase to a theta position.

Given the restriction in (21), it is possible to explain why phrases that are definite like *which*-phrases participate in the so-called subject-object asymmetry when the quantifier is *every*. When extraction proceeds from the object position, the PL-reading is available because the fronted phrase, or some part of it, can be reconstructed into the [Spec, AgroP] which is below the quantifier in subject position. This is shown in (22). On the other hand, when the *wh*-phrase is extracted from the subject position, the only site available for reconstruction is [Spec, IP] if the phrase is presuppositional (e.g., a *which/whose*-phrase) since (21) will prevent reconstruction into the VP-internal subject position. But [Spec, IP] is not below [Spec, AgroP], the position where *every* is at LF (see (23)) so the PL-interpretation is predicted to be absent when extraction involves a definite *wh*-phrase in subject position. In the case of *each* the relevant reading will be available because that quantifier will move to the left of IP, as in (19) above, and the [Spec, IP] site will be available for reconstructing the *wh*-phrase. In (22) and (23) I have enclosed the available positions in ovals and crossed-out the unavailable ones.

This in itself is not a bad thing since native speakers' judgments also vary much with respect to whether sentences with a subject *who* allow for PL-readings. Most speakers seem to be able to get the relevant reading in a sentence like (7) above, but many other speakers seem to have a hard time getting the relevant reading in very similar sentences. This may be related to the fact that *who* is not neatly categorized as a definite or an indefinite as the marginality of (i) suggests, at least for some speakers.

(22)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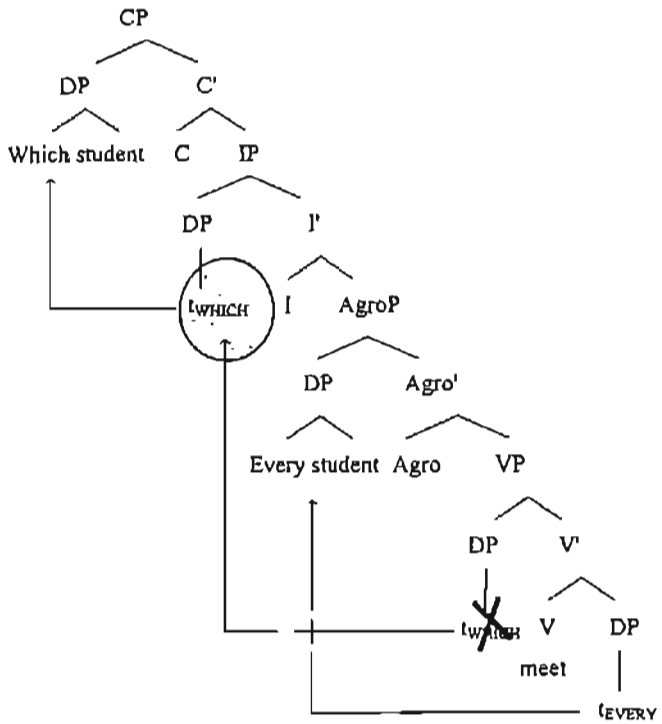
(23)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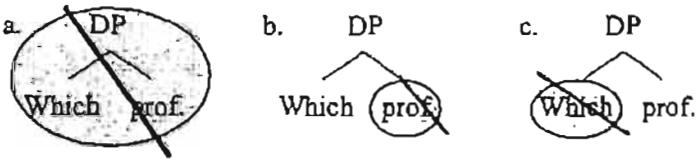
To summarize, in this section we have seen that *each* and *every* must be assigned a different syntax if we want to account for the contrast between sentences like (12b), on the one hand, and sentences like (13b), on the other. We have also seen that the so-called subject-object asymmetry depends on two things: the type of the *wh*-phrase (definite vs. indefinite), and the quantifier present in the sentence (*each* vs. *every* etc.). This section also confirmed the hypothesis that PL-readings arise when the *wh*-phrase (or some part of it) can be reconstructed below the quantifier in the sentence. I haven't explained, however, how reconstruction proceeds exactly. I will do that in the next section.

3. Reconstruction Under the Copy Theory of Movement

In what follows I will adopt a copy-theory of movement. In this theory, movement leaves copies of the displaced-constituents in the original site. In this approach reconstruction consists of deletion of higher copies with interpretation of lower ones. Following Cresti (1996), I will assume that deletion can take place in any of the ways in (24)

(24)



Deletion can affect a whole DP (24a), the NP argument of the determiner (24b), or just the determiner (24c). I will assume that copies in theta-positions are never deleted, but are rather replaced by variables of the appropriate kind. Under fairly standard assumptions, the *wh*-determiner must remain in [Spec, CP] at LF in order to provide a suitable meaning for the question. This means that only the type of deletion in (24b) can affect a *wh*-phrase in [Spec, CP]. After a copy is deleted as in (24b) another copy must be deleted as in (24c), and all remaining copies in non-theta position must be deleted as in (24a) under the general interpretive principle that at most and at least one copy of each lexical item must be interpreted. I proceed now to investigate how the reconstruction view of PL-readings can be matched with a Karttunen style semantics for questions.

3.1 A Semantics for the Reconstruction View

I will assume that *wh*-phrases are semantically ambiguous between first-order existential quantifiers over individuals and higher-order existential quantifiers over functions of type <e, e> (cf. Engdahl (1986), and Chierchia (1993)). In this view the meaning of a phrase like *which boy* is as in (25a-b) depending on whether the phrase is interpreted as a first- or a higher-order quantifier.

(25) a. $\lambda P \exists x[boy(x) \wedge P(x)]$
b. $\lambda P \exists f[boy(f(x)) \wedge P(f(x))]$[6]

[6] Notice that the variable 'x' in (25b) is free. I will explain below how this variable gets bound.

I will adopt a Karttunen style semantics for questions. In Karttunen's approach, a question denotes the set of true propositions that jointly constitute its answer(s). Thus, the question *who smokes?* denotes the set in (26).

(26) {p: p is true and for some x, p = x smokes}
= λpꓱx[p is true and p = x smokes]

In a world in which the smokers are John and Mary, (26) contains the propositions that John smokes and that Mary smokes. This much is enough as a background for the semantics of questions assumed in this paper. Let us see now how the pieces resulting from partial deletion get interpreted. I assume that the interrogative determiner is the locus of quantificational force in an interrogative DP. So a DP with the NP deleted will only contribute quantificational force to the structure it is part of. On the other hand, an interrogative DP with the determiner deleted will retain the argument-taking property of the DP as a whole. That is, in a sense it will be interpreted as a quantifier without quantificational force. The intended interpretations for the copies of the DP *which professor,* in (27a-b), are given in (27(c-d)-(e-f)) depending on whether the phrase is interpreted as a first- or a higher-order quantifier.

(27) a. DP b. DP

Which ~~prof.~~ ~~Which~~ prof.

c. ꓱx d. λP[professor(x) ∧ P(x)]

e. ꓱ*f* f. λP[professor(*f*(x)) ∧ P(*f*(x))]

With this much in mind, I try to explain in the next section why PL-interpretations depend on the possibility of syntactic reconstruction.

3.1.1. Grounding Reconstruction in the Meaning of the *Wh*-phrase

I will assume with several authors (e.g., Engdahl (1986), Chierchia (1993), Sharvit (1997)) that PL-readings are functional readings. This means that for such interpretations to be available, a phrase like *which boy* will have to be interpreted as in (25b), i.e., as an existential quantifier over Skolem functions. However, under such an interpretation, there is a free individual variable inside the restriction of the *wh*-phrase that needs to get bound somehow if the sentence as a whole is to be interpretable. The need for syntactic reconstruction becomes clear then: reconstructing the restriction of the *wh*-phrase below a quantifier provides a chance to bind the free individual variable with the index of the quantifier. Thus, a question like (28a) allows for a PL-answer because reconstruction can proceed as in (28b).

(28) a. Which boy did every girl kiss?
b. [CP [which ~~boy~~]$_k$ [C' did [IP [every girl]$_j$ [AgroP [~~which~~ boy]$_k$ [VP t_j kiss t_k]]]]]

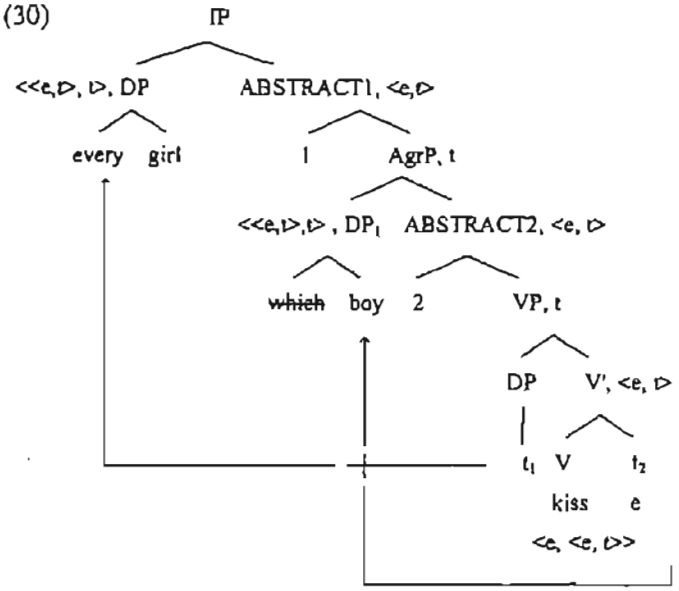
I assume that a functional *wh*-phrase only leaves an individual variable in theta position (i.e. t_k in (28b)) rather than a layered variable as assumed by Chierchia (1991,

1993). The functional variable appears only in the restriction of the *wh*-phrase together with a free individual variable as in (25b)[7]. The individual variable in the position of t_k in (28b) is bound by *[~~which~~ boy]* in [Spec, AgroP]. To bind the individual variable inside *[~~which~~ boy]*, we need to make sure that the index of the universal quantifier in [Spec, IP] gets copied onto that variable. One can just assume that there is a free indexing mechanism that assigns indices freely to the free variable. The sentence will converge when it is assigned the index of the quantifier. Thus, any assignment function will assign the same values to the individual variable of the universal quantifier and the one in the *wh*-restriction. The pieces of (28b) translate as in (29) on the PL-reading.

(29) a. $[\![[\text{which } \sout{\text{boy}}]]\!] = \exists f$
b. $[\![\text{CP}]\!] = \lambda p \exists f [p \text{ is true} \wedge p = [\![\text{IP}]\!]]$

A detailed representation of the meaning of the IP-node is given in (30). I will treat tense and agreement in syncategorematic terms. I have copied the index 1 of the universal quantifier onto the DP in [Spec, AgroP]. The index of the original movement to [Spec, AgroP] will be used in abstracting over the individual variable in theta position.

(30)



After all the compositional rules have applied, the meaning of the IP-node is as in (31). See appendix for details. I will feel free to ignore intentions when convenient.

[7] One might wonder how the individual variable gets inside the restriction of the *wh*-phrase given that the *wh*-determiner only binds the functional variable. Chierchia (1991, 1993) assumes that the variable is projected in the syntax as a null pronominal element adjoined to the noun restrictor of the *wh*-phrase. To incorporate his proposal to the current research I will have to assume that the empty pronominal is adjoined to the head of the noun phrase in the lexicon and gets pied-piped when the noun raises in *wh*-movement. Since movement leaves identical copies behind there will be a copy of this pronominal element at all the intermediate sites used by the *wh*-phrase on its way to Comp. The head noun and the adjoined pronominal element respectively contribute the function and the individual variable in the *wh*-restriction.

(31) $[\![IP]\!] = [\![\text{every girl}]\!](\lambda y[\text{boy}'(f(y)) \wedge \text{kiss}'(y, f(y))])$
$= \forall x[\text{girl}'(x) \rightarrow \text{boy}'(f(x)) \wedge \text{kiss}'(x, f(x)]$

If we plug in now the meaning of the IP-node in (31) into the Karttunen style denotation in (29b), for the CP representing the interrogative in (28a), the result is the denotation given in (32).

(32) $[\![CP]\!] = \lambda p \exists f[p \text{ is true} \wedge p = \hat{}\forall x[\text{girl}(x) \rightarrow \text{boy}(f(x)) \wedge \text{kiss}'(x, f(x))]]$

(32) is an appropriate representation of the PL-interpretation. The formula after the '=' sign says that every girl kisses some individual that is related to her by some function, and the individual is a boy. So the set denoted by the question is going to be a singleton set consisting of the conjunction of all the propositions obtained by pairing each girl with the boy that is related to her by the function *f* and the kissing relation. Thus, in a world where Jane, Mary, and Susi kissed Bob, Paul, and Bill, respectively, the question denotes the set in (33); a singleton set.

(33) {Jane kissed Bob, and Mary kissed Paul, and Susi kissed Bill}

Consider now a sentence like (34a), with the structure in (34b), where the *which*-phrase has been extracted from the subject-position.

(34) a. Which boy kissed every girl?
b. [CP [which ~~boy~~]$_k$ [IP [~~which~~ boy]$_k$ [AgroP [every girl] [VP t_k kiss t_j]]]]

Given the structure in (34b), the *which*-phrase in (34a) cannot be interpreted as a functional *wh* because its restriction would contain a free individual variable. The problem is that in the structure in (34b) the restriction cannot be interpreted below the quantifier given the definiteness of the *which*-phrase and Diesing's Restriction.

It is clear now why questions like (14b), repeated below for convenience, do not allow for a PL-answer:

(35) **Which boy** seems to his mother to have met **each girl**? (SA, *PL)

For (35) to have a PL-reading, the *wh*-phrase needs to be interpreted functionally. This requires that the restriction of the *wh*-phrase be lowered below *each* in the embedded clause so that this quantifier can bind the free variable inside the restriction of the *wh*. But if we do this, the pronoun in the phrase *his mother* in the matrix clause will be left without a binder. So we have two variables and no way to bind them both. The solution to the conflict is to interpret the *wh*-phrase as a first-order existential in which case reconstruction is not necessary since the individual variable is bound by the interrogative determiner (see (25a)). The first-order interpretation of the *wh*-phrase, however, only yields the single answer interpretation of the question. The same analysis can be given to the cases in (4) involving the absence of PL-readings in the presence of Condition C. I leave it to the reader to verify that the analysis is the same.

4. Conclusion

In this paper I have shown that nesting configurations are neither sufficient nor necessary to license PL-readings. I showed that PL-answers can also occur in crossing configurations and that in any of the contexts in which PL-interpretations occur, such readings are only possible if the restriction of the *wh*-phrase can be lowered below the quantifier in the sentence. Any theory of list-readings should therefore explain why reconstruction is necessary. The analysis has been able to account for cases concerning the interaction of list readings and Condition C, on the one hand, and the distribution of such readings in the raising construction, on the other. These data had not been considered before and remain, as far as I know, major counterexamples to any of the previous approaches to the phenomenon. My proposal involves slight modifications of some of Chierchia's (1993) assumptions. In particular I have assumed that functional variables occur in the restriction of the *wh*-phrases rather than in theta position. The analysis also posits a free individual variable in the restriction of a functional *wh*. These modifications were imposed by the need to relate reconstruction to the availability of PL-interpretations.

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Appendix

Calculating the meaning of the IP-node in (30). Denotations are relative to worlds and assignment functions. I ignore the empty assignment 'Ø'.

Entries for the relevant nodes (terminal and non-terminal)
For any world W, and any assignment g.

1. $[\![\text{every}]\!]^w = \lambda P[\lambda Q \forall x[P(x) \rightarrow Q(x)]$
2. $[\![\text{girl}]\!]^w = \lambda x\{\text{girl}(x) \text{ in } w]$
3. $[\![\sout{\text{which}}\ \text{boy}]\!]^w = \lambda P[\text{boy}(f(x)) \text{ in } w \wedge P(f(x))]$
4. $[\![\text{kiss}]\!]^w = \lambda x\{\lambda y[\text{kiss } (y, x) \text{ in } w]\}$

Meanings by semantic rules.
5. $[\![\text{every girl}]\!]^w = \lambda Q \forall x[\text{girl}(x) \text{ in } w \rightarrow Q(x)]$ by 1, 2, Function Application (FA), and two applications of Lambda Conversion (LC)
6. $[\![\text{IP}]\!]^w = [\![\text{every girl}]\!]^w ([\![\text{ABSTRACT1}]\!]^w)$ by FA. =
7. $[\![\text{every girl}]\!]^w (\lambda z[\![\text{AgrP}]\!]^{w,\, g[z-1]})$ by Lambda Abstraction (LA). =
8. $[\![\text{every girl}]\!]^w (\lambda z[[\![\sout{\text{which}}\ \text{boy}]\!]^{w,\, g[z-1]} ([\![\text{abstract2}]\!]^{w,\, g[z-1]})])$ by FA. =
9. $[\![\text{every girl}]\!]^w (\lambda z[[\![\sout{\text{which}}\ \text{boy}]\!]^{w,\, g[z-1]} (\lambda y[\![\text{VP}]\!]^{w,\, g[z-1],\, y-2})])$[8] by LA =
10. $[\![\text{every girl}]\!]^w (\lambda z[[\![\sout{\text{which}}\ \text{boy}]\!]^{w,\, g[z-1]} (\lambda y[[\![\text{kiss}]\!]^{w,\, g[z-1],\, y-2} ([\![\text{t2}]\!]^{w,\, g[z-1],\, y-2})([\![\text{t1}]\!]^{w,\, g[z-1],\, y-2})])])$ by two applications of FA. =
11. $[\![\text{every girl}]\!]^w (\lambda z[[\![\sout{\text{which}}\ \text{boy}]\!]^{w,\, g[z-1]} (\lambda y[\lambda u[\lambda v[\text{kiss } (v, u) \text{ in } w]](y)(z)])])$ by 4 and the values that g assigns to t_2 and t_1. =
12. $[\![\text{every girl}]\!]^w (\lambda z\{[\![\sout{\text{which}}\ \text{boy}]\!]^{w,\, g[z-1]} (\lambda y[\text{kiss } (z, y) \text{ in } w\})])$ by two applications of Lambda conversion (LC). =
13. $[\![\text{every girl}]\!]^w (\lambda z[\lambda P[\text{boy}(f(x_1)) \text{ in } w \wedge P(f(x_1))]^{w,\, g[z-1]} (\lambda y[\text{kiss } (z, y) \text{ in } w])])$ by 3, and the result of copying the index 1 onto the free variable in the *wh*-restriction. =
14. $[\![\text{every girl}]\!]^w (\lambda z[\lambda P[\text{boy}(f(z)) \text{ in } w \wedge P(f(z))] (\lambda y[\text{kiss } (z, y) \text{ in } w])])$ by 13 and the result of applying the function 'g'. =
15. $[\![\text{every girl}]\!]^w (\lambda z[\text{boy}(f(z)) \text{ in } w \wedge \text{kiss } (z, f(z)) \text{ in } w])$ by two applications of LC. =
16. $\lambda Q \forall x\{\text{girl}(x) \text{ in } w \rightarrow Q(x)] (\lambda z[\text{boy}(f(z)) \text{ in } w \wedge \text{kiss } (z, f(z)) \text{ in } w])$ by 5. =
17. $\forall x[\text{girl}(x) \text{ in } w \rightarrow \lambda z[\text{boy}(f(z)) \text{ in } w \wedge \text{kiss } (z, f(z)) \text{ in } w] (x)]$ by LC. =
18. $\forall x[\text{girl}(x) \text{ in } w \rightarrow \text{boy}(f(x)) \text{ in } w \wedge \text{kiss } (x, f(x)) \text{ in } w]$ by LC.

This last formula is equivalent to the one given in (31), at a particular index, for the IP-node.

[8] Here g[z-1], y-2 is to be read as an assignment 'g' modified to assign the value z to 1 and further modified to assign the value y to 2.